

## ADVANCED SHOPPING CART AND BILLING USING RFID TECHNIQUE

ARPITA SEN<sup>1</sup> & MARUTI B LIMKAR<sup>2</sup>

<sup>1</sup>ARMITE College, Assangaon, Mumbai, India

<sup>2</sup>Professor Prof Maruti B Limkar Department of Electronics

EngineeringTerna Engineering College, Nerul Navi Mumbai, India

### ABSTRACT

*In today's globalized world people are more exposed to various mode of entertainment, shopping mall is one of the biggest place of entertainment especially in metro cities. During any festival or some day's malls offer big discounts and people rush to grab such offers. But during such time most of us spend more time at the billing counter than shopping counter because of long queue at the billing section. Our main intention of developing this project is to reduce this long waiting time at the billing counter. This paper gives a new concept which can be used in shopping complex for purchase of the products. In this paper the concept of RFID card is used as security access for product. If the product is put in to the trolley means it will show the individual amount and also the total amount of purchase. In this paper RFID card is used for accessing the products also. So this paper improves the security performance and also the speed of purchase.*

**KEYWORDS:** Radio Frequency Identification, RFID Tag, RFID Reader & Shopping Trolley

**Received:** Dec 27, 2017; **Accepted:** Feb 08, 2017; **Published:** Feb 17, 2017; **Paper Id.:** IJEERAPR20174

### INTRODUCTION

#### An Overview on Rfid

RFID is a wireless device which can be attached with any object for identification purpose. It has mainly two types, one without any active power supply and connected with battery and another with an active power supply. Unlike barcode, it is fine if the tags are not within line of sight of the reader and may be embedded in the tracked object. RFID tags are used in many industries like automobile industry during production so that to track its progress through the assembly line and it's also used in livestock's to track them. In our paper we use passive RFID tags to identify each and every product of shopping mall instead of barcode system. This will help us to improve the shopping technique and will be very much helpful for people of urban life. [2]

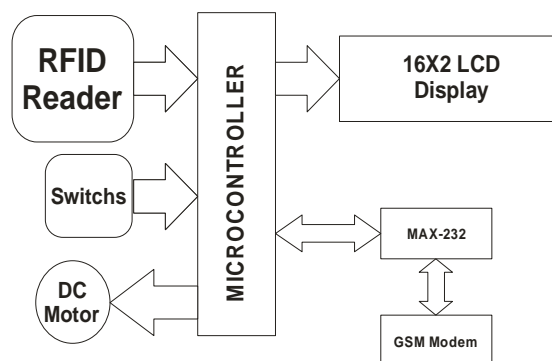
#### An Introduction to the Rfid Based Smart Shopping Cart

Now days numbers of shopping malls are increasing due to increasing public demand & spending. Continuous improvement is required in the traditional billing system for betterment of experience to the customers. To reduce this problem we introduce Advance Shopping Cart and Billing Using RFID Technique. This type shopping cart will be attached with RFID reader, items with the RFID tags. Customer will carry a LCD display so that they can view their own shopping items along with the price tags. This smart method will save energy and time of customers along with resource required in mall and cost associated with the product [8].

## LITERATURE SURVEY

RFID is a nascent technology, deeply rooted by its early developments in using radar as a harbinger of adversary planes during World War II. A plethora of industries have leveraged the benefits of RFID technology for enhancements in sectors like military, sports, security, airline, animal farms, healthcare and other areas. Industry specific key applications of this technology include vehicle tracking, automated inventory management, animal monitoring, secure store checkouts, supply chain management, automatic payment, sport timing technologies, etc. This paper introduces the distinctive components of RFID technology and focuses on its core competencies: scalability and security. It will be then supplemented by a detailed synopsis of an investigation conducted to test the feasibility and practicality of RFID technology. [4]

## BLOCKDIAGRAM AND DESCRIPTION



**Figure 1: Block Diagram of Smart Trolley**

The architecture of proposed work RFID BASED SHOP- PING TROLLEY is as shown in above figure. Power requirement of the system to perform desired operation is fulfilled by the power supply unit in the circuit. The system consists of a microcontroller as a brain of the system. This microcontroller is programmed to perform the desired operation of the system by controlling the function of the components in the circuit.

The system consists of two relay circuit to drive a DC motor, interfaced in this system to open and close the gate in the shopping mall. A RFID reader is interfaced with this microcontroller, which is used to identify the material selected by the user to which a RF tag is connected. In this system some switches are provided to put the material IN or to cancel OUT switch should be pressed. These switches are interfaced with the microcontroller. The system also consists of a LCD display to show the selected material taken ADD or REMOVED by the costumer. The system consists of a GSM modem interfaced with the microcontroller through a MAX 232 device [3].

## HARDWARE UNITS

- **Trolley Unit:** In this unit the RFID reader and barcode reader are attached to ARM processor. when customer keeps any shopping item into shopping trolley this RFID reader reads the tag and sends a signal to the Processor. It gets stored in the processors memory which is compared with lookup table. If it matches then it shows the name of item on LCD & also the total amount of items purchased.
- **Billing Unit:** With completion of shopping user comes near the billing counter. The total bill will display on the billing computer.

- **Power Supply:** The AC supply is applied to 12V step down transformer. The output of transformer is 12V AC which is rectified using a diode bridge. The output of Diode Bridge of 12VDC is filtered by capacitors.
- **RFID Tags:** RFID tags are mainly of two types, one without any battery called passive tags and another with the battery called active tags. We mainly use passive tags for our system for analyze the barcode's image data and sending the barcode's content to the output port of scanner.
- **IR Sensor:** IR sensor is used for detecting a select light wavelength in the infra-red (IR) spectrum by using a specific light sensor. In IR sensor, LED is used that produces light at the same wavelength as what the sensor looking for
- **LCD Display** LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. 16 Characters x 2 Lines Built-in HD44780 Equivalent LCD Controller Works directly with ATMEGA, ARDUINO, PIC and many other microcontroller/kits. 4 or 8 bit data I/O interface Low power consumption.
- **RF Module:** RFID reader consists of an RF module that acts as a transmitter and receiver of radio frequency signal. Transmitter consists of an oscillator to create the carrier frequency; a modulator to make impact on data commands upon this carrier signal & a receiver that contains demodulator to extract the data returned. RFID Reader Module This is a low frequency (125Khz) RFID reader with serial output with at range of 8-12cm. It is a compact units with built in antenna and can be directly connected to the PC using RS232 protocol.

## SOFTWARE

BASCOM-8051 is a software product that will be described, all of us are familiar with microcontrollers with developing process of writing and rewriting a program until the final solution is reached. In general scenario, assembler was used for writing the code, and other software packages were used for checking and simulating a program. Chips were programmed in (handmade) programmer. BASCOM = Basic Compiler

BASCOM-8051 is a magnificent solution to the above mentioned scenario. In fact, BASIC compiler for Intel's MCS-51 microcontroller family and its derivatives made by Philips, Siemens, Dallas, Atmel, Temic and others

- Editor
- BASIC compiler
- Assembler
- Simulator
- Terminal Emulator
- LCD designer

- LIB manager
- Programmer (software part only)

The entire software was written for MS Windows 95/98/NT. It is delivered on three diskettes, and after decompressing files and running a setup program, we can start working with BASCOM. A little note on installation: the installation procedure requires having at least one printer installed before you run a setup. So, if you don't have a printer installed into your system, install one first and then run a setup [9].

## CIRCUIT DIAGRAM AND DESCRIPTION

At the time of shopping when customer puts any product on the shopping trolley RFID tags attached with the items of shopping will be read by the RFID reader automatically. During this process all information regarding the product like total price, discount given to the product will be stored in the memory and also will be linked up with the microprocessor. Then processor will send all information via RS232 to the sever. LCD display device will display all information regarding shopping to the customer. Any cancellation of product can also be done by pressing cancellation button in the LCD device. At the end of the shopping customer will press finish button and then cumulative bill will be generated and displayed on the LCD. Then customer have to synchronize his mobile banking with the processor for final billing. Once verification of OPT is done by the customer then main gate of shopping trolley will be open for the customer for final exit.[7]

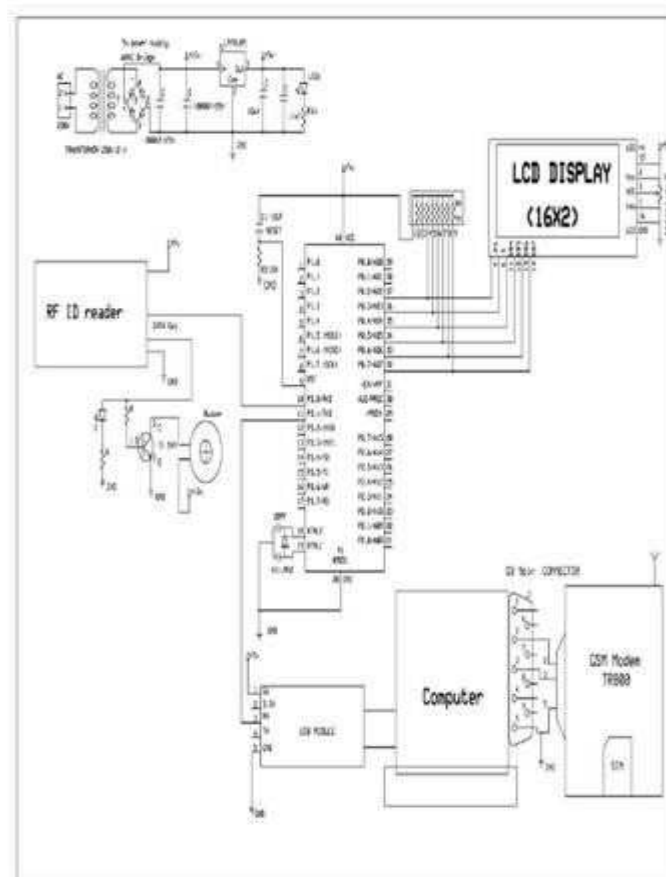
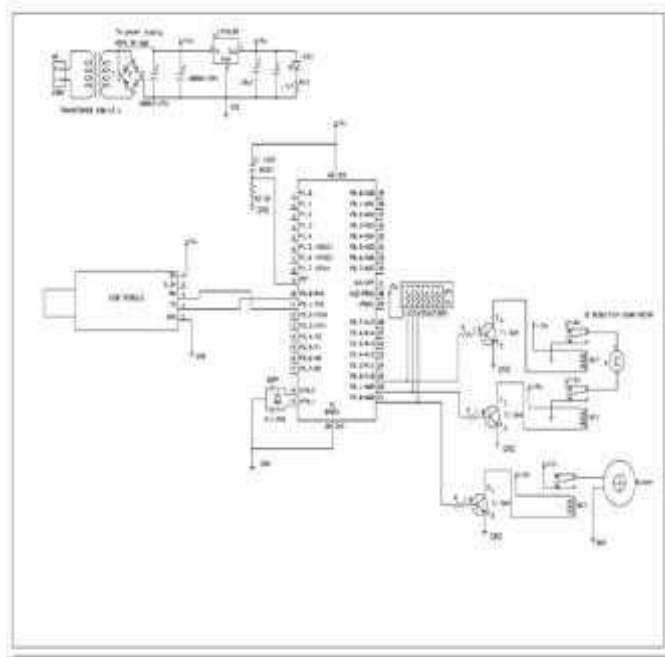


Figure 2: Circuit Diagram of Trolley



**Figure 3: Circuit Diagram of Gate**

## SYSTEM ALGORITHM AND FLOWCHART

The working of our product can be explained in following steps.

- When shoppers with the cart press start button the system turns ON and then all the components such as RFID reader, microcontroller and ZigBee start working.
- Every product has an RFID tag which contains unique id. These Ids are fed in the database assigned to the corresponding products.
- When the shopper drops any product in the cart then the RFID reader reads the tag and at the same time every information about the product is stored and displayed on the LCD screen
- These steps are repeated until the end of shopping button is pressed. Once the End Shopping button is pressed the total bill is send to master pc via Wi-Fi (ZigBee).
- There is also a option provided to delete some of the products from the cart and the bill will be updated accordingly, This goes by the customer choice.
- While customers finishes their shopping they can pay the bill automatically from their mobile phone and leave the billing counter.
- Server PC will update the inventory list of products after each shopping.
- If a product is accidentally put into the shopping trolley then customer can remove it manually from the while checking list of products and press cancel transaction button.
- When customer will put any item into the trolley price of that item including discounts and offers will also be displayed [5].

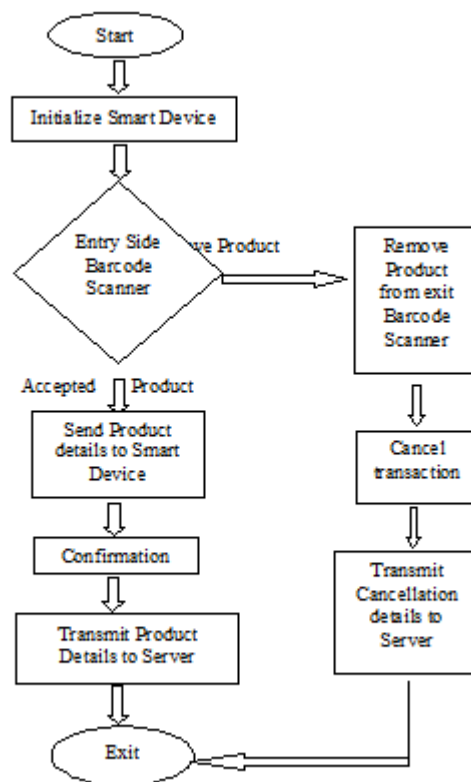


Figure 4: Flow Chart of Shopping Trolley

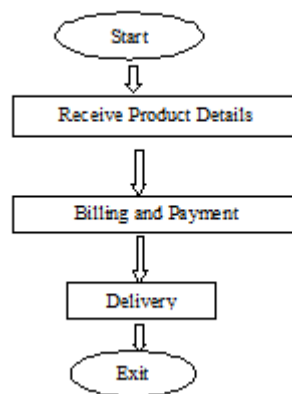


Figure 5: Flow Chart of Billing System

## COMPARISON

The comparison between the existing solution and the proposed system is described in the table below.

Table 1: Comparison

Sl.	Existing System	Proposed System
1.	Person is required to read bar-code on product	Automatic reading of RFID tag from product
2.	Barcode must be visible on the surface of product	RFID can be placed inside the product
3.	Line of sight required to a read barcode	No line of sight required to read RFID

Table 1: Contd.,		
4.	The readability of barcodes can be impaired by dirt, moisture, abrasion, or packaging contours	RFID tags are not affected by such conditions
5.	Short reading distance	Long reading distance
6.	Barcode does not have READ & WRITE capability	RFID tag having READ & WRITE capability

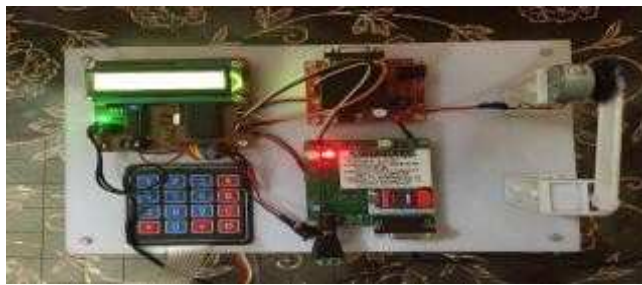
## RESULTS

The following result has been observed after making the hardware model.

**Table 2: Result**

Sr. No.	Total Amount of Bill	OTP Generated	No of Items	Total Discount Given
1.	460/-	1900	8	46/-
2.	1030/-	1940	14	73/-
3.	560/-	1060	6	31/-
4.	260/-	3800	6	28/-

## HARDWARE IMPLIMENTATION



**Figure 6: Project Proto**



**Figure 7: Verification of Customer Mobile No**



**Figure 8: Automatic Item Billing**



**Figure 9: Sending OTP to Customer Mobile**



**Figure 10: Verification of OTP**



**Figure 11: Customer Exit**

## CONCLUSIONS

RFID based shopping trolley can not only saves customer's time but also it is helpful to manage the inventory of shopping mall more efficiently. Centralized server is connected to microcontroller for proper synchronization of shopping process. Our paper exploits the existing developments and different types of RFID technologies are used for product identification, billing, etc. We have also learned the architecture of the can save time, energy and money of the consumers. A proven technology, Radio Frequency Identification has the potential to dramatically improve various industrial and service applications through automatic detection, unique identification and control. RFID is expected to provide immense supply chain efficiencies, reduce labor costs, and accurate real time process. The RFID technology will determine visibility on developing the business processes in a correct manner and of complete transparency [6].

## ACKNOWLEDGMENT

We would like to acknowledge the contribution of all the people who have helped in reviewing this paper. We would also like to thank our families and friends who supported us in the course of writing this paper. The intended objectives were successfully achieved in the prototype model developed. The developed model has easy access, is economical and showcases an intelligent and easy shopping experience to reduce time, energy of the consumers. Few challenges are yet to be resolved to make the proposed system more robust, but there is also no doubt that with the RFID having a wide scope in supply chain management, the proposed model has the potential to improve.



## REFERENCES

1. Dr.Suryaprasad J, Praveen Kumar B O, Roopa D Arjun A K, A Novel Low-Cost Intelligent Shopping Cart, Proceedings of the 2nd IEE International Conference on Networked Embedded Systems for Enterprise Applications NESEA 2011, Perth, Australia, December 8-9, 2011.
2. Swati Zope, Prof.MarutiLimkar, "RFID based Bill Generation and Payment through Mobile",International Journal of Computer Science and Network (IJCSN), Volume 1, Issue 3, June 2012.
3. G. Roussos and B. College, "Enabling RFID in Retail", Computer, IEEE, vol. 39, no. 3, 2006, pp. 25-30.
4. Saurabh Kumar Sultaina, GouravJaiswal, PrateekJain "RFID Based Automatic Shopping Cart " CONTROL THERORY& INFORMATICS ISSN 2224- 5774(PRINT) ISSN2225-0492(ONLINE), VOL1, NO1, 2011.
5. Vanitha "Smart Shopping Experience Based On RFID"International Conference on Computing and Control Engineering (ICCCE2012), 12&13 APRIL, 2012
6. Sachita Roy, UditGangwal, JyotsanaBapat, Robert Bakker, Edwin Keijsers, and Hans van der Beak "Smart Shopping Cart For Automated Billing Purpose Using Wireless Sensor Networks" the seventh international conference on sensor technologies &applications.
7. S. Sainath, K. Surender, V. Vikram Arvind, J. Thangakumar"Automated Shopping Trolley for Super Market Billing System" International Journal of Computer Applications (0975 – 8887).
8. Kalyani Dawkhar<sup>1</sup>, Shraddha Dhomase<sup>2</sup>,Samruddhi Mahabaleshwarkar "Electronic Shopping Cart For Effective Shopping based on RFID" international journal of innovative research in electrical, electronics, instrumentation and control engineering Vol. 3, Issue 1, January 2015.
9. Savi Technologies. "Active and Passive RFID: Two Distinct, But Complementary, Technologies for Real-Time Supply

